

## CLAIMS

1. An excavating machine comprising:
  - a bucket coupled to a hoist rope and to a drag rope;
  - a machinery housing, the machinery housing including:
    - a hoist drum coupled to the hoist rope;
    - a drag drum coupled to the drag rope;
    - a ring hoist motor coupled to the hoist drum to drive the hoist drum; and
    - a ring drag motor coupled to the drag drum to drive the drag drum, the drag drum and the hoist drum working together to extend or retract the bucket; and
    - a drag variable speed AC drive system electrically connected to the ring drag motor;
  - and
  - a hoist variable speed AC drive system electrically connected to the ring hoist motor, wherein the drag and hoist variable speed drives selectively rotate the hoist and drag drums, respectively, to effect a digging operation.
2. The excavating machine as defined in claim 1, wherein the hoist drum is coupled to a rotor of the gearless ring hoist motor.
3. The excavating machine as defined in claim 1, wherein the drag drum is coupled to a rotor of the gearless ring drag motor.
4. The excavating machine as defined in claim 1, further comprising a variable speed AC drive electrically connected to the hoist motor and the drag motor to drive the hoist and the drag motors.

5. The excavating machine as defined in claim 1, where the hoist motor and the drag motor are each ring motors.
6. The excavating machine as defined in claim 4, wherein the variable speed AC drive includes an active front end rectifier circuit.
7. The excavating machine as defined in claim 4, wherein the variable speed drive includes an inverter circuit comprising at least one of an Insulated Gate Bipolar Transistor (IGBT) switching circuit or an Integrated Commutating Gate Transistor (IGCT) switching circuit or an Injection Enhanced Gate Transistor (IEGT) switching circuit.
8. The excavating machine as defined in claim 4, wherein the AC variable speed drive comprises an AFE rectifier circuit for rectifying AC utility power to a DC signal and an inverter circuit for converting the DC signal to a frequency controlled signal for controlling the drag and hoist motors.
9. The excavating machine as defined in claim 8, wherein the AFE rectifier circuit and the inverter circuit each use power transistors driven by a digital controller to produce firing signals.
10. The excavating machine as defined in claim 9, wherein the power switching devices are at least one of an IGBT device, an IGCT device, or an IEGT device.
11. The excavating machine as defined in claim 1, wherein the ring hoist motor is integral with the hoist drum and the ring drag motor is integral with the drag drum.

12. An excavating machine, comprising:
  - a bucket;
  - at least one rope coupled to the bucket for raising and lowering the bucket;
  - a drum coupled to an end of the rope;
  - a ring motor having a rotor coupled to the drum; and
  - an inverter drive system electrically connected to the ring motor to rotate the rotor in the ring motor, wherein as the rotor is rotated, the drum is rotated to move the rope to effect an excavation operation.
13. The excavating machine as defined in claim 12, wherein the ring motor comprises a ring-shaped stator circumventing the rotor.
14. The excavating machine as defined in claim 12, wherein the drum is configured to hoist the bucket.
15. The excavating machine as defined in claim 12, further comprising a second drum coupled to an end of a second rope and to the bucket, the second drum being configured to drag the bucket toward the excavating machine.
16. The excavating machine as defined in claim 12, wherein the inverter drive system is an active front end inverter.
17. The excavating machine as defined in claim 12, wherein the excavating machine is a dragline.

18. The excavating machine as defined in claim 12, wherein the excavating machine is a mining shovel.

19. The excavating machine as defined in claim 12, wherein the ring motor is integrated into the drum.

20. An excavating machine, comprising:

    a variable speed AC drive;

    a ring motor, electrically connected to the variable speed AC drive;

    a drum coupled to the rotor of the ring motor;

    a rope, coupled at a first end to a digging element and at a second end to the drum;

    wherein the variable speed drive selectively activates the ring motor to rotate the rotor such that the drum rotates to move the rope and the digging element to effect a digging operation.

21. The excavating machine as defined in claim 20, wherein the variable speed drive comprise an inverter supply.

22. The excavating machine as defined in claim 20, wherein the variable speed drive comprises an active front end inverter.